

PATENT APPLN. NO. 10/532,082  
SUBMISSION UNDER 37 C.F.R. § 1.114

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REMARKS

Claim 1 has been amended to limit the polymer from which the aggregate of nanofibers of the present invention is made to a thermoplastic polymer selected from the group consisting of PET, PBT, PTT, PLA, N6, N66, polyolefin and polyphenylene sulfide. The amendment to claim 1 is supported in the present application by the description of the thermoplastic polymers used in the Examples.

The claims as amended ensure an interpretation of the claims as being limited to the use of water insoluble polymers.

The amendment to claim 1 has been made in light of the results of a personal interview among the Examiner, Ms. Sykes, Supervisory Primary Examiner Larry Tarazano, and applicants' undersigned representative on March 9, 2011. During the interview the Examiners noted that the thermoplastic polymers as recited in claim 1 as amended in the response filed September 17, 2010, when given their broadest reasonable interpretation, include water soluble polymers.

The claims as amended are respectfully submitted to be patentable over the combinations of prior art references used to reject the claims in the Final Office Action dated December 1, 2010.

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In the Final Office Action, claims 1, 4, 8, 10-12, 16-19, 53, 56, 57 and 59 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fong et al., *Beaded nanofibers formed during electrospinning*, Polymer 40 (1999) 4585-4592 (hereinafter: "Fong"), in view of Deitzel et al., *Controlled deposition of electrospun poly(ethylene oxide) fibers*, Polymer 42 (2001) 8163-8170 (hereinafter: "Dietzel"), and further in view of Gogins et al., US 2004-0116025 A1 (hereinafter: "Gogins"). Claims 1, 4 and 10 are also rejected under 35 U.S.C. § 103(a) as being unpatentable over Theron et al., *Electrostatic field-assisted alignment of electrospun nanofibres*, Nanotechnology, 12 (2001), 384-390 (hereinafter: "Theron"), in view of Fong. Claims 12 and 59 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Theron in view of Fong and further in view of Dietzel. Claims 8, 10-12, 16-19, 56 and 57 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Theron in view of Fong and further in view of Dietzel and Gogins.

The rejection of claims 1, 4 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Theron in view of Fong and the rejection of claims 12 and 59 under 35 U.S.C. § 103(a) as being unpatentable over Theron in view of Fong and further in view of Dietzel are not proper. In these rejections the Office relies on Fong as

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disclosing the electrospinning of water insoluble polymers. However, as was explained in the response filed September 17, 2010, and as explained by the undersigned during the interview on March 9, 2011, Fong is limited to a method for producing nanofibers by an electrospinning method using water soluble polymers. The Examiner conceded during the interview that "Fong alone would not give one of ordinary skill in the art enough direction to use a water insoluble polymer." (See lines 4-5 of the Continuation Sheet of the Interview Summary mailed March 15, 2011).

Therefore, removal of these rejections is in order.

Regarding the rejection of claims 1, 4, 8, 10-12, 16-19, 53, 56, 57 and 59 under 35 U.S.C. § 103(a) as being unpatentable over Fong in view of Deitzel and further in view of Gogins, and the rejection of Claims 8, 10-12, 16-19, 56 and 57 under 35 U.S.C. § 103(a) as being unpatentable over Theron in view of Fong and further in view of Dietzel and Gogins, these rejections are not proper because Fong and Gogins cannot be properly combined and, if combined as proposed by the Office, will not necessarily result in an aggregate of nanofibers having the single fiber fineness as defined by the claims.

As explained above, in the Interview Summary the Examiner conceded that Fong alone would not give one of ordinary skill in

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the art enough direction to use a water insoluble polymer. However, the Interview Summary states that the Examiner noted during the interview that Gogins teaches that "the claimed water insoluble polymers could be electrospun from solutions." (Interview Summary, lines 5-6 of the Continuation Sheet). The Office concludes in the Interview Summary, based on this teaching, that "[a]s such, the combination of the two references could arrive at the claimed invention since one of ordinary skill in the art would be well advised of suitable solvent systems." (Interview Summary, lines 6-7 of the Continuation Sheet).

Applicants respectfully submit that the position of the Office is, in effect, a new ground of rejection. The rejections in the Final Office Action are based on a conclusion of the Office that it would have been obvious to one of ordinary skill in the art to use other polymers as taught by Gogins as the thermoplastic material in the method of Fong. (See, for example, page 6, lines 7-9, of the Final Office Action). However, as has been conceded by the Office, Fong alone would not give one of ordinary skill in the art enough direction to use a water insoluble polymer. Nowhere in the Final Office Action does the Office take the position that Fong could be modified to use suitable solvent systems. Therefore, the grounds

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of rejections as stated in the Final Office Action are not proper and should be removed.

Moreover, to the extent that the Office is now suggesting that it would have been obvious to a person of ordinary skill in the art to modify the method of Fong to use water insoluble polymers and a different solvent system than that disclosed in Fong, such modification is not supported by the references and will not result in the aggregate of nanofibers of the present invention.

Fong explains on page 4585, right column, lines 9-12, that formation of nanofibers obtained by electrospinning is mainly affected by three factors of solution, i.e., solution viscosity, net charge density and surface tension. Fong further describes on page 4585, right column, lines 12-15, that higher net charge density not only favors formation of fibers without beads, but also favors the formation of thinner fibers. These descriptions indicate that, for obtaining nanofibers having a small fiber fineness and a small spread of single fiber fineness by electrospinning, higher net charge density of polymer solution is needed.

Fong describes on page 4585, right column, lines 22-27, that to obtain higher net charge density of polymer solution, addition of NaCl is effective. This effect of addition of NaCl is shown in

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Fig. 2 (page 4588) and Table 2 (page 4591). As can be seen, only the solution used in 2f is effective for obtaining nanofibers having a diameter less than 100nm and having no beading. Nanofibers having a diameter less than 100nm and having no beading were not obtained according to the conditions of 2a to 2e. Characterization of the solutions used in 2a to 2f is described in Sample Nos. A to F in Table 1 (page 4586). The solution used in 2f is Sample F consists of 3 g of PEO, 97 g of water and 1.5 g of NaCl. The other samples have less content of NaCl than Sample F.

These results indicate that, for obtaining nanofibers having a small fiber fineness and a small spread of single fiber fineness by electrospinning, a high content of NaCl is required. As would be understood by a person of ordinary skill in the art, such a high content of NaCl is possible only in water solution, and other solvents will not be able to dissolve such a high content of NaCl.

Therefore, the simple substitution of different polymers and solvent systems in Fong as proposed by the Office will not necessarily result in nanofibers having a small fiber fineness and a small spread of single fiber fineness. Fong is evidence that the obtaining of such fibers is not possible by electrospinning using different solvent systems. The Office has not shown by proper evidence or reasoning that the conditions that will result in

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nanofibers having a small fiber fineness and a small spread of single fiber fineness by electrospinning using water insoluble polymers and suitable solvent systems would have been obvious to one of ordinary skill in the art from Fong or Gogins or the combination thereof.

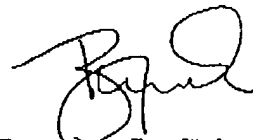
Withdrawal of rejections that rely on Fong and Gogins, alone or in combination, is in order and is respectfully requested.

Applicants acknowledge with appreciation the kind and helpful interview extended to their undersigned attorney on March 9, 2011, by Examiner Sykes and SPE Tarazano.

The foregoing is believed to be a complete and proper response to the Office Action dated December 1, 2010.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension and any additional required fees may be charged to Deposit Account No. 111833.

Respectfully submitted,  
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